

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

DIPARTIMENTO DI INGEGNERIA ELETTRICA E DELLE TECNOLOGIE DELL'INFORMAZIONE

PHD PROGRAM IN INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

Seminar announcement

Friday 10 March 2023, Time: 16:00 – 17:00

Sala riunioni DIETI (ex Softel), Floor 1, Ed. 3/A - DIETI - Via Claudio, 21 NAPOLI



Dr. Paolo Braca

NATO Science and Technology Organization (STO)

Centre for Maritime Research and Experimentation (CMRE)

Artificial Intelligence for Defense Seabed-to Space Situational Awareness

Abstract: Modern surveillance systems require integrating coherently all available sources of information to compose an operational picture that is as complete as possible. While in the past surveillance had suffered from a lack of data, current technology transformed the problem into one of an overabundance of information, leading to an extreme need for automated analysis. Current surveillance sensors generate vast amounts of data that were previously unthinkable; as a result, processing, calibration, parameter tuning, and other such operations must be automated to the greatest extent possible.

Achieving this requires novel paradigms for algorithmic design, and Artificial Intelligence (AI) and Data Fusion (DF) offer an unprecedented opportunity to enhance our technological edge. However, there is also a risk that the speed of the threats we face will increase. The surveillance task is complicated by the diversification of threats, whose nature and

origin are often unknown. AI and DF techniques can identify patterns within these large datasets, fused from a variety of sources and generated by monitoring vast areas on a daily basis, and use the acquired knowledge to anticipate the possible evolution(s) of the operational picture.

The presentation will focus on the combination of information from both underwater and above-water surveillance sensors, enabling Seabed-to-Space Situational Awareness (S3A). Real-world examples, including Underwater Critical Infrastructures (such as the Nord Stream sabotage) and the Suez Canal blockage, will be discussed to illustrate the capabilities and significance of S3A. The recent operational outcomes of the PROMENADE projects will also be presented and deliberated.

Information about PROMENADE available at <https://www.promenade-project.eu/>.

Lecturer short bio: Paolo Braca (Senior Member, IEEE) received the Laurea degree (summa cum laude) in electronic engineering (2006) and the Ph.D. degree (Hons., 2010) in information engineering from University of Salerno, Italy. In 2009, he was Visiting Scholar with the ECE Department, University of Connecticut. From 2010 to 2011, he was a Postdoctoral Associate with the University of Salerno. In 2011, he joined the NATO Science and Technology Organization (STO) Centre for Maritime Research and Experimentation (CMRE), where he is currently a Senior Scientist and a Project Manager. He led research projects funded by the EU, by the U.S. Office of Naval Research (ONR), and other national and international institutions. He conducts research in the general area of machine learning and statistical signal processing with emphasis on detection and estimation theory, wireless sensor network, multi-agent algorithms, target tracking and data fusion, adaptation and learning over graphs, radar (sonar) signal processing, and machine learning. He has coauthored more than 200 publications in international scientific journals, conference proceedings, and NATO technical reports. He was awarded with the National Scientific Qualification to function as Associate and Full Professor in Italian Universities, in 2017 and 2018, respectively. In 2019 he was Adjunct Professor at the University of Cassino, Italy. He is in the technical committee of the major international conferences in the field of signal processing and data fusion. He received the Best Student Paper Award (first runner-up) at FUSION conference in 2009, and the NATO STO Scientific Achievement Award (SAA) 2017 for his contribution to the "Development and Demonstration of Networked Autonomous ASW". In 2019 he received the Best Paper Award (first runner-up) at the SSPD conference. He received the IET 2019 Premium Award for Best Paper published on the IET Radar Sonar & Navigation. He was also a recipient of the NATO STO SAA, in 2020, as a Team Leader for the "Advances in Artificial Intelligence and Information Fusion for Maritime Situational Awareness." He received the Young Scientist Contest Award at the Signal Processing Symposium 2021. He serves as Associate Editor (AE) for the IEEE Transactions on Aerospace and Electronic Systems, ISIF Journal of Advances in Information Fusion, and IET Radar, Sonar and Navigation, and served as AE for IEEE Signal Processing Magazine, IEEE Transactions on Signal Processing, and EURASIP Journal Advances on Signal Processing. In 2017, he was Lead Guest Editor of the Special Issue "Sonar Multi-Sensor Applications and Techniques" in IET Radar, Sonar and Navigation.

For information: Prof. Antonio De Maio (DIETI, UniNA) – antonio.demaio@unina.it